

REMARKS

This amendment, submitted in response to the Office Action dated November 29, 2001, is believed to be fully responsive to each point of rejection raised therein. Accordingly, favorable reconsideration on the merits is respectfully requested.

As a preliminary matter, claim 1 has been objected to for containing informalities. Applicant has amended claim 1 to correct the informalities. The correction does not narrow the scope of the claims.

Turning to the merits of the Office Action, claims 1-4 and 6 have been rejected under 35 U.S.C. § 102 as being anticipated by Whitehead (U.S.P. 4,733,229). Claim 5 has been rejected under 35 U.S.C. § 103 as being unpatentable over Whitehead in view of McLaughlin et al. (U.S.P. 5,570,108, hereafter "McLaughlin"). Applicant respectfully submits the following arguments in traversal of the prior art rejections.

Applicant's invention relates to an image display for medical diagnoses. Known medical image diagnosis techniques include forming an image, such as an MRI or x-ray, on a light transmitting recording material. The image is then backlit with a device having a high output brightness. In order to replicate the medical image on a computer display, the computer display device must also have high brightness to permit an operator to diagnose the image correctly. However, when the display device displays both the medical image and non-image information, such as text or user menus, the non-image information areas will be exceedingly bright, causing eyestrain for the viewing operator. Known devices require a manual adjustment of the brightness for viewing between image and non-image areas of the display, which makes the device inconvenient and inefficient to use.

Applicant's invention overcomes the above deficiencies by providing different luminance levels for image areas and non-image areas. As an exemplary embodiment of the invention, Fig. 1 illustrates a light source drive unit 16 for driving a backlight unit 14. The backlight unit illuminates a display device, such as an LCD 12, though other types of displays can also be used. The backlight 14 includes multiple light sources 30 which vary in brightness depending on a current level supplied via the drive units 16a. A personal computer 24 receives a diagnostic medical image from various medical devices R. User interfaces 26, 28 determine whether an entire screen of the image is to be output at an image maximum luminance or whether a selected portion of the screen is output at an image maximum luminance and the remainder of the screen is output at an ordinary maximum luminance. Image and non-image areas can be determined based on data supplied from the PC, such that image areas have level values between 0 and 1023, whereas non-image areas have level values between 0 and 127 when displayed. The brightness of individual light sources 30 can be adjusted to distinguish image and non-image areas.

Turning to the cited art, Whitehead relates to an image display device whereby selected parts of an image area can be highlighted by a user to have greater contrast than non-selected areas of the image. Whitehead achieves this object by 1) providing a narrower window of values for the highlighted portions to increase contrast (see col. 5, line 67 to col. 6, line 2); and 2) by using a higher intensity type CRT for an entire display. See Col. 3, lines 29-32. Referring to Fig. 2 of Whitehead, image data is input to a transfer function table 30, with the background image undergoing a different transformation than the highlighted portion of the image. Col. 3, lines 61-66. The highlight portion is brightened by switching on additional gun for a CRT or increasing a gain of the D/A converter 32. The transfer functions for highlight and background

regions are illustrated in Figs. 3(a)-3(e). Significantly, the background image window of Fig. 3(a) includes 1024 display levels for 1-200 input levels. The highlight window of Fig. 3(b) includes the same number of display levels 1024 for a smaller range of input levels 1-100.

McLaughlin relates generally to a display controller for calibration of brightness levels and color matching.

The Examiner contends that independent claim 1 is anticipated by Whitehead. Applicant submits that the rejection is not supported for at least three reasons.

First, claim 1 describes an image maximum luminance level for displaying an image and an ordinary maximum luminance level for displaying non-image information. The Examiner contends that the highlight region 20 displays an image and that the background region 21 displays a non image. However, both the highlight and background regions of the CRT in Whitehead display image information. The highlight portion merely corresponds to a sub-portion of the whole image. Whitehead does not contemplate simultaneous display of image and non-image areas. For instance, the region 21 is described as a background image. See col. 3, lines 36-40; col. 4, lines 22-27. Additionally, the image memory 26a transfers image information to the transfer function tables 30. Col. 3, lines 57-61. The transfer function table information serves as the basic data from which highlighted data is selected. Curiously the Examiner relies on Col. 3, lines 57-64 for teaching the image and non-image areas. However, col. 3, line 59 specifically describes the background area as an image area. Therefore, both the highlighted and non-highlighted portions (background portions) comprise image data. The Examiner's reliance on Col. 4, lines 52-57 is equally misplaced. Col. 4 describes that transfer

functions for highlight and background regions provide different contrast. However, this contrast is provided by providing a narrower range of represented values in the highlight region (see Fig. 3b) in comparison with the represented values in the background region (see Fig. 3a). Therefore, the anticipation rejection should be withdrawn for at least this reason.

Second, claim 1 describes an image maximum luminance level for displaying an image and an ordinary maximum luminance level for displaying non-image information, where the ordinary maximum luminance is lower than the image maximum luminance. The Examiner contends that the various transfer curves for producing higher contrast in the highlighted window would carry out the primary object of the invention and correspond to the ordinary and image maximum values. Both col. 4, lines 54-57 and col. 7, lines 1-4 relate to higher contrast. However, claim 1 refers to relative luminance levels, rather than relative contrast.

Third, as a related matter, the Examiner is improperly focusing on the general objects of the invention and the Whitehead reference to maintain the anticipation rejection. While both improve the viewability of images, Whitehead focuses on the problem of isolating one image region from another image region by improving contrast. As discussed in length in the Whitehead reference, the contrast is improved by mapping a narrower range of input levels to the same range of output levels, including a maximum level of 1024 regardless of whether the background or highlight portion is considered. See Figs. 3a (background) and Fig. 3b (highlight). By contrast, the present invention adjusts the luminance levels for a non-image region, e.g. a text or menu region, in comparison to an image region. By contrast, it appears that the maximum levels for both the highlight and background regions of Whitehead correspond to 1024. Therefore, claim 1 is patentable for at least this reason.

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Because claims 2-4 and 6 are dependent upon claim 1, these claims are patentable for at least the reasons set forth above for the independent claim.

With regard to claim 5, the Examiner concedes that Whitehead does not operate in accordance with a graphic user interface. The Examiner cites McLaughlin to make up for this deficiency. However, McLaughlin fails to make up for the deficiencies of Whitehead as discussed above. Therefore, claim 5 is patentable for at least this reason.

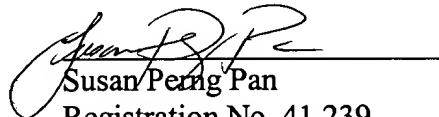
Applicant has added claims 7-16 to describe features of the invention more particularly.

In view of the above, Applicant submits that claims 1-6 and newly added claims 7-16 are in condition for allowance. Therefore it is respectfully requested that the subject application be passed to issue at the earliest possible time. The Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary.

Applicant hereby petitions for any extension of time which may be required to maintain the pendency of this case, and any required fee, except for the Issue Fee, for such extension is to be charged to Deposit Account No. 19-4880.

Respectfully submitted,

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APPENDIX
VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Claim 1 (Amended). A display device, having:

at least two [set] sets of maximum [luminances] luminance including an image maximum luminance for displaying an image and an ordinary maximum luminance for displaying non-image information, said ordinary maximum luminance being lower than said image maximum luminance.

Claims 7-16 are added as new claims.